

## **REMARKS**

### **Status of the Claims**

Claims 30-60 are pending in this application and Claims 30-47 are presently under examination. New Claims 61 and 62 are added herein. Claims 48-60 are cancelled by this Amendment. Applicants reserve the right to prosecute the non-elected claims at a later date. Claims 30, 35, 37, 39 and 46 have been amended. All claim amendments are supported by the specification, therefore no new matter has been added by these amendments.

Applicants respectfully request reconsideration of the present amendment based on the foregoing amendments and the following remarks.

### **Rejection of Claims 30-47 Under 35 U.S.C. § 112, Second Paragraph**

Claims 30-47 were rejected under 35 U.S.C. § 112, second paragraph, as indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention, as follows.

The Examiner stated that Claims 30 and 46 recited a "pore volume" in units of g/cc, and were unclear as to whether the chromium was in the divalent state before or after the carbon monoxide contacting step. Applicants respectfully note that the Examiner's reference to Claim 47 appears to be in error and should in fact refer to Claim 46. Claims 30 and 46 are amended herein to clarify these claims, and to obviate the Examiner's rejections. Applicants also draw the Examiner's attention to the amendment of Claim 46 to describe a polymerization catalyst system comprising a chromium catalyst composition, to distinguish this composition from the chromium catalyst of part a of Claim 46 and to render this claim definite.

The Examiner also stated that in Claims 35 and 37, the ratios given as atom ratios of “metal” which implied to the Examiner that the metal is in the elemental oxidation state. Claims 35 and 37 are amended herein to remove the descriptor “metal” and obviate the Examiner’s rejections.

The Examiner further stated that the recital of “and mixtures thereof” in dependent Claim 39 appears to broaden the scope of Claim 30, the claim from which Claim 39 depends. Applicants respectfully note that this language does not broaden Claim 30 for the following reasons. Claim 30 is amended herein to recite “and mixtures thereof” in reference to the metal alkyl, as fully supported by the specification (page 11, line 17) and original Claim 1. Thus, Claim 30 and dependent Claim 39 encompass a dialkyl aluminum alkoxide cocatalyst in combination with at least one compound selected from alkyl zinc compounds, alkyl aluminum compounds, alkyl boron compounds, or mixtures thereof, as originally disclosed. Accordingly, the recitation of “mixtures thereof” in Claim 39 is commensurate with the scope of Claim 30.

Applicants have amended Claims 30, 35, 37, 39, and 46 to obviate the Examiners rejections. Therefore, Applicants respectfully request the withdrawal of this rejection.

**Rejection of Claims 30-45 Under 35 U.S.C. §103(a), As Unpatentable Over Debras In View of Konrad or Witt**

Claims 30-45 were rejected under 35 U.S.C. §103(a), as unpatentable over U.S. Patent No. 6,245,869 to Debras et al. (“Debras”), in view of either U.S. Patent No. 4,845,176 to Konrad et al. (“Konrad”) or U.S. Patent No. 3,947,433 to Witt (“Witt”).

It is the Examiner’s position that Debras discloses a chromium catalyst supported on a titanated silica in combination with aluminum or zinc alkyls, with a porosity and surface area of

the support material reading on that of the present invention. The Examiner stated that although Debras lacks the disclosure of the particular combination of cocatalysts of the present invention, Konrad allegedly teaches the use of lithium alkyl cocatalysts and aluminum alkyl alkoxide cocatalysts with chromium catalysts, and Witt allegedly teaches the use of boron alkyls and aluminum alkyl alkoxides with chromium catalysts. The Examiner concluded that it would have been obvious, to one of ordinary skill in the art, to apply the teachings of Witt or Konrad to the disclosure of Debras with a reasonable expectation of obtaining a useful catalyst with the expected benefit of the polymer having shear response and known molecular weight distribution. Applicants respectfully traverse this rejection for the following reasons.

Claim 30 is directed to a catalyst composition comprising the product resulting from the combination of a chromium catalyst, produced by contacting a chromium-containing, titanium-containing, silica-containing solid with carbon monoxide such that a substantial portion of the chromium is in the divalent state after contacting with carbon monoxide, and a cocatalyst as specified in part b of Claim 30. The polymer produced by the present invention sustains a low melt index (MI) and high load melt index (HLMI) as polymer density decreases, as compared to standard catalysts (specification, page 19, lines 14-16; page 23, lines 13-15).

Applicants respectfully submit that Debras does not teach or suggest a chromium catalyst as claimed in Claim 30-45. Rather, Debras discloses a chromium-based catalyst that is fluorinated and reduced by carbon monoxide. According to Debras, this results in a catalyst containing typically from 0.2 to 2 weight percent fluorine, based on the weight of the chromium-based catalyst (col. 3, lines 20-22). Nowhere does Debras, alone or in combination with Konrad or Witt, suggest that a reduced chromium-based catalyst can be prepared in the absence of fluorination. Thus, the combination of Debras in addition to Konrad or Witt still does not change

the underlying make-up of the fluorinated chromium-based catalysts of Debras in a manner that renders Claim 30-46 obvious.

Respectfully, Applicants further note that, according to Debras (col. 4, lines 50-52), “[t]he combined use of fluorination and Co (*sic.*) reduction of the catalyst tends to depress the melt index of the catalyst” (emphasis added). Nowhere does Debras, alone or in combination with Konrad or Witt, suggest that melt index (MI) can be maintained below that of standard catalysts *without* the use of a fluorinated chromium-based catalyst (specification, page 19, lines 14-16; page 23, lines 13-15).

Respectfully, Applicants maintain that Debras does not teach or suggest Applicants’ Claim 30, and the disclosures of Konrad or Witt do not provide any teaching or suggestion that overcomes the deficiencies of Debras. Because Claims 31-45 depend directly or indirectly from Claim 30, Applicants respectfully submit that these claims are also neither taught or suggested by the cited references, either alone or in combination. Therefore for at least these reasons, Applicants respectfully request that this rejection be withdrawn and these claims be allowed.

Applicants direct the Examiner’s attention to new Claims 61 and 62. New Claim 61 is drawn to a catalyst composition comprising the product resulting from the combination of a chromium catalyst and a cocatalyst, wherein the chromium catalyst consists essentially of a chromium-containing, titanium-containing, silica-containing solid that has been contacted with carbon monoxide under conditions such that a substantial portion of the chromium is in the divalent state after contacting with carbon monoxide. New Claim 62 is drawn to a catalyst composition comprising the product resulting from the combination of a chromium catalyst and a cocatalyst, wherein the chromium catalyst is substantially free of fluorine. Both Claims 61 and

62 differ in scope from Claim 30, both fully supported by the specification, and both are patentable over the art of record.

**Rejection of Claims 46-47 Under 35 U.S.C. §103(a), As Unpatentable Over Debras In View of Konrad or Witt, and In Further View of Benham**

Claims 46 and 47 were rejected under 35 U.S.C. §103(a), as unpatentable over Debras, in view of either Konrad or Witt, and in further view of U.S. Patent No. 5,237,025 to Benham et al. ("Benham").

The Examiner states that Debras, Konrad and Witt all lack the disclosure of combining a chromium catalyst with a titanium, zirconium or vanadium aluminum Ziegler-Natta catalyst, but that Benham teaches it is conventional to make such a combination. It is the Examiner's position that it would have been obvious, to one of ordinary skill in the art, to apply the teachings of Benham to the disclosures of Debras, Witt and Konrad, with a reasonable expectation of obtaining an olefin polymerization catalyst, such that Claims 46 and 47 are rendered obvious. Applicants respectfully traverse this rejection for the following reasons.

Claim 46 is drawn to a dual catalyst composition comprising a chromium catalyst composition resulting from the combination of a chromium catalyst with a cocatalyst, and a Ziegler-Natta catalyst composition. The chromium catalyst composition of Claim 46 is drawn to a composition resulting from the combination of a chromium catalyst, produced by contacting a chromium-containing, titanium-containing, silica-containing solid with carbon monoxide such that a substantial portion of the chromium is in the divalent state after contacting with carbon monoxide, and a cocatalyst as specified in part b of Claim 30.

Applicants respectfully submit that Debras, Witt and Konrad, whether combined with Benham or not, do not teach or suggest a dual catalyst composition as claimed in Claim 46 and 47. Rather, Debras discloses a chromium-based catalyst that is fluorinated and reduced by carbon monoxide. According to Debras, this results in a catalyst containing typically from 0.2 to 2 weight percent fluorine, based on the weight of the chromium-based catalyst (col. 3, lines 20-22). Debras further discloses that (col. 4, lines 50-52), “[t]he combined use of fluorination and Co (*sic.*) reduction of the catalyst tends to depress the melt index of the catalyst” (emphasis added). Thus, Benham fails to remedy the deficiencies of Debras, Konrad, and Witt, either alone or in combination.

Nowhere do Debras, Konrad, and Witt, alone or in combination with Benham, suggest that a dual catalyst composition comprising a reduced chromium catalyst can be prepared in the absence of fluorination. Thus, the combination with Benham still does not change the underlying make-up of the fluorinated chromium-based catalysts of Debras in a manner that renders Claim 46 and 47 obvious. Further, nowhere does Debras, Konrad, and Witt, alone or in combination with Benham, suggest that melt index (MI) can be depressed below that observed using conventional catalysts *without* the use of a fluorinated chromium-based catalyst.

Respectfully, Applicants submit that, for at least these reasons, the art of record fails to teach or suggest Claim 46, hence Claim 46 is allowable. Since Claim 47 recites additional features and depends directly from Claim 46, Applicants also submit that this claim is allowable over the art of record.

### CONCLUSION

The foregoing is submitted as a full and complete Response to the Office Action dated October 16, 2001. For at least the reasons given above, Applicants respectfully submit that Claims 30-47, 61, and 62 define patentable subject matter. Accordingly, Applicants respectfully request allowance of these claims.

Please note that a "Petition For Revival of Abandoned Application Under 37 C.F.R. 1.137(b)," and a check in the amount of \$1,300.00, is filed concurrently with this Submission. No additional fees are believed due; however, the Commissioner is hereby authorized to charge any deficiency, or credit any overpayment, to Deposit Account No. 11-0855.

Should the Examiner believe that anything further is necessary in order to place the application in better condition for allowance, the Examiner is respectfully requested to contact Applicants' representative at the telephone number listed below.

Respectfully submitted,



By: David E. Wigley, Ph.D.  
Reg. No. 52,362

Kilpatrick Stockton LLP  
Suite 2800  
1100 Peachtree Street  
Atlanta, Georgia 30309-4530  
Telephone: (404) 745-2420  
Facsimile: (404) 541-3441

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